

EXHIBIT A

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12 VIDEOTAPED DEPOSITION OF ROHIT CHATTERJEE
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22 Reported by:
 LORI STOKES
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25 Pages 1 - 296

<p>Page 58</p> <p>1 BY MR. PAIGE:</p> <p>2 Q Okay. Would you agree that if changes to APIs do not result in any issue with backwards compatibility that the changes will not cause problems for developers?</p> <p>3 MR. RAMSEY: Objection. Form.</p> <p>4 THE WITNESS: Could you restate that again? It was a long sentence.</p> <p>5 BY MR. PAIGE:</p> <p>6 Q Would you agree that if changes to APIs do not result in any issues with backwards compatibility that the changes will not cause problems for developers?</p> <p>7 MR. RAMSEY: Objection. Form.</p> <p>8 THE WITNESS: There could be other issues, also. I don't know -- I don't know one way or the other if backwards compatibility is the only reason why it would cause some problems. I just don't know.</p> <p>9 BY MR. PAIGE:</p> <p>10 Q Does your analysis reveal whether the APIs you examined are backwards compatible?</p> <p>11 MR. RAMSEY: Objection. Form.</p> <p>12 THE WITNESS: I did not conduct any analysis. The data that I was asked to collect, I</p>	<p>Page 60</p> <p>1 MR. RAMSEY: Sure.</p> <p>2 BY MR. PAIGE:</p> <p>3 Q Do you believe you have expertise relevant to this case?</p> <p>4 MR. RAMSEY: Objection. Form.</p> <p>5 THE WITNESS: I have -- I have expertise conducting some of the things that I was asked to do in this particular case.</p> <p>6 BY MR. PAIGE:</p> <p>7 Q So what is the expertise that you have that is relevant to this case?</p> <p>8 A I have an understanding of -- of how to sort of collect these types of data, writing scripts, to do that. I have expertise in sort of like usage of some tools that I've used in this particular -- the recollection effort.</p> <p>9 I have -- like I said, I've done Java programming before. I have programmed in different languages before. And so all of those, I think, are relevant to the work that I've done.</p> <p>10 Q Do you have any expertise in deciding what sort of changes would matter to developers?</p> <p>11 MR. RAMSEY: Objection. Form.</p> <p>12 THE WITNESS: I don't have like specific expertise in sort of designing that particular</p>
<p>Page 59</p> <p>1 mean, had deprecated code in them. So I would guess that that would cover backward compatibility in some sense.</p> <p>2 Again, I'm -- I haven't really thought about backward compatibility as a separate issue, so I can't really comment on that.</p> <p>3 BY MR. PAIGE:</p> <p>4 Q Could you determine from the data you collected whether the APIs are backwards compatible?</p> <p>5 MR. RAMSEY: Objection. Form.</p> <p>6 THE WITNESS: I would need to know what the definition of backward compatibility is in this particular context. I would have to go back and see if the data actually contained those -- the contours that are defined in that particular definition of backward compatibility, and then I would check it that way.</p> <p>7 But I can't -- I don't know.</p> <p>8 MR. PAIGE: Okay.</p> <p>9 MR. RAMSEY: Can we take a break when you get a chance, just whenever it's convenient for coffee? No particular rush.</p> <p>10 MR. PAIGE: Sure. Just a few more questions.</p>	<p>Page 61</p> <p>1 metric at this time. Or I haven't done that. But I can think about it if I was asked to do that.</p> <p>2 MR. PAIGE: Okay. Let's take a break.</p> <p>3 THE VIDEOGRAPHER: Going off the record.</p> <p>4 The time is 10:07.</p> <p>5 (Short break taken.)</p> <p>6 THE VIDEOGRAPHER: Back on the record.</p> <p>7 The time is 10:17.</p> <p>8 BY MR. PAIGE:</p> <p>9 Q Mr. Chatterjee, welcome back.</p> <p>10 A Thank you.</p> <p>11 Q You understand that you're still under oath, correct?</p> <p>12 A Sorry?</p> <p>13 Q You understand that you're still under oath, correct?</p> <p>14 A I am. I do.</p> <p>15 Q Okay. What work did you do on Dr. Kemerer's report?</p> <p>16 MR. RAMSEY: Objection. Form.</p> <p>17 THE WITNESS: I -- he had asked me to collect data that he wanted to do for his own analysis, helped him sort of gather that data.</p> <p>18 BY MR. PAIGE:</p> <p>19 Q What specific portions of Dr. Kemerer's</p>

<p style="text-align: right;">Page 134</p> <p>1 Q So data manipulation for v1-13.R, is that 2 what does the R script for API levels 1 through 13?</p> <p>3 A It is used in the -- yes. It is used in 4 the -- sort of like changing the data format for v1 5 to 13, yes.</p> <p>6 Q And what is used for API levels 14 7 through 23?</p> <p>8 A I used a PHP scraper parser.</p> <p>9 Q Where is that PHP parser?</p> <p>10 A I think I -- can I refer back to that?</p> <p>11 Q Sure, of course.</p> <p>12 A We talked about the PHP parsing scripts. 13 I have to go back to...</p> <p>14 This one here, I think, parse v3.PHP... 15 Commented.PHP are the parsing scripts.</p> <p>16 Q So there is no R script that was run for 17 API levels 14 through 23?</p> <p>18 MR. RAMSEY: Objection. Form.</p> <p>19 THE WITNESS: API levels 14 through 23, I 20 did run -- let's see. I did run the R script for 21 API level -- was it for 13 specifically?</p> <p>22 So ultimately -- let me just explain the 23 process. All of these API levels 1 to 13 or 14 to 24 23 then got combined and was -- was sent through 25 another R script.</p>	<p style="text-align: right;">Page 136</p> <p>1 in there. But I need to open up the folder to take 2 a look.</p> <p>3 Q Is that API levels 13 and 14?</p> <p>4 A That's right, yeah.</p> <p>5 Q Why is there something specific for those 6 API levels?</p> <p>7 A The file format changed, like I showed 8 you, XML, from API levels 1 through 13. And 14 9 onwards, I think it's the TXT format. Just to make 10 sure that the XML format -- whenever there's a 11 change in format, I want to make sure that at the 12 inflection point, whenever the change happens, the 13 data is accurately captured. So I just ran it for 14 13 and 14 specifically.</p> <p>15 MR. PAIGE: Exhibit 1602, please. (Deposition Exhibit 1602 was marked for 17 identification by the court reporter.)</p> <p>18 BY MR. PAIGE:</p> <p>19 Q Mr. Chatterjee, I've put before you 20 Exhibit 1602, which is the contents of folder 12 21 Understand Scripts.</p> <p>22 Could you tell me what's in this folder, 23 please, sir?</p> <p>24 A There's Python scripts -- primarily 25 Python scripts, there's a read me file. There's</p>
<p style="text-align: right;">Page 135</p> <p>1 So yes, in that respect, the 14 to 23 2 data also got through the R scripts.</p> <p>3 BY MR. PAIGE:</p> <p>4 Q Where is the other R script through which 5 that data is sent?</p> <p>6 A This one here, JDK stability analysis.R.</p> <p>7 Q So you ran the Android code through JDK 8 stability analysis.R?</p> <p>9 A Oh, sorry. I misspoke.</p> <p>10 It's a similar file. I don't know if 11 the -- it's not the JDK. It's probably -- this 12 information is probably from the Java site. But I 13 used an R script for that. But there is a similar 14 Android stability analysis file, as well. I would 15 need to look at where exactly, but I think I 16 provided it.</p> <p>17 Q You don't see it here in this folder, do 18 you?</p> <p>19 A So it could be in the stability 20 analysis_1 through 23. It could be in there.</p> <p>21 Q What is instability analysis 13-14?</p> <p>22 A So I think that it contains maybe the PHP 23 script or the R script once more. And maybe a read 24 me file sort of giving the instruction on why I put 25 that in. What happens in -- that's probably what's</p>	<p style="text-align: right;">Page 137</p> <p>1 also information on, I think, the CSV output from 2 this tool that I used, Understand, for Java and for 3 Android. And I can't recall what's under the zips, 4 probably zipped of these versions or something.</p> <p>5 Q So what are these files, sir?</p> <p>6 MR. RAMSEY: Objection to form.</p> <p>7 THE WITNESS: These are the -- some of 8 the -- this is the files I used to invoke 9 Understand for collecting the page ranks course 10 for -- sorry, I misspoke. For the dependency 11 portion of that particular analysis that 12 Dr. Kemerer was running.</p> <p>13 BY MR. PAIGE:</p> <p>14 Q So these files were used with Understand 15 to get out the data you wanted from Understand; is 16 that right?</p> <p>17 A Yeah. So these are the files I was 18 describing before, which is they come primarily 19 from the documentation -- from Understand's 20 documentation.</p> <p>21 And I wrote it in a way which I just took 22 most of the information from there and put it in. 23 There's multiple ways of doing it. You can use 24 your -- it has a good user interface, as well. 25 People can run it that way. I used this way to</p>

<p style="text-align: right;">Page 138</p> <p>1 access Understand.</p> <p>2 Q Okay. There are other ways you could</p> <p>3 have accessed Understand, right?</p> <p>4 A That's right.</p> <p>5 Q Okay. And generateDependency.SH.</p> <p>6 What is that?</p> <p>7 A That's what I call a shell script.</p> <p>8 Q Okay.</p> <p>9 A It's essentially like if you think</p> <p>10 about -- if you have a terminal, and you're trying</p> <p>11 to write -- you're trying to find out what the</p> <p>12 file -- number of files are, what the files are in</p> <p>13 that particular folder, you write a set of</p> <p>14 commands.</p> <p>15 This is a wrapper script that I wrote</p> <p>16 just for convenience so that I don't have to</p> <p>17 manually repeat some of the processes that I was</p> <p>18 asked to do.</p> <p>19 Q And was that an input to Understand, as</p> <p>20 well?</p> <p>21 A These are, like I said, shell scripts.</p> <p>22 So they might have information that I sent to the</p> <p>23 Understand tool --</p> <p>24 Q Yeah.</p> <p>25 A -- to run it.</p>	<p style="text-align: right;">Page 140</p> <p>1 those things which came from Understand.</p> <p>2 Q Okay.</p> <p>3 MR. PAIGE: We'll go onto Exhibit 1603,</p> <p>4 please.</p> <p>5 (Deposition Exhibit 1603 was marked for</p> <p>6 identification by the court reporter.)</p> <p>7 BY MR. PAIGE:</p> <p>8 Q Mr. Chatterjee, I've put in front of you</p> <p>9 Exhibit 1603. It is the contents of 13 PageRank</p> <p>10 NetworkX Android.</p> <p>11 And could you tell me what the files in</p> <p>12 there are, please, sir?</p> <p>13 A These are the files that I believe are</p> <p>14 inputs and -- inputs into the NetworkX tool that I</p> <p>15 used to calculate page rank scores for Android.</p> <p>16 (Reporter clarification.)</p> <p>17 BY MR. PAIGE:</p> <p>18 Q And what are the files that end with</p> <p>19 .JSON?</p> <p>20 A That's just -- JSON is the data format.</p> <p>21 It's -- it's -- it's an intermediary output which</p> <p>22 forms the input for running the NetworkX tool.</p> <p>23 Q And how do you generate the JSON output?</p> <p>24 A I believe it's the DGraph.py, the Python</p> <p>25 script that generates the JSON file.</p>
<p style="text-align: right;">Page 139</p> <p>1 So I mean, in that sense, it contains</p> <p>2 some information that I provided to Understand.</p> <p>3 Q Okay. And you wrote it yourself, right?</p> <p>4 A These ones, yes.</p> <p>5 Q Yeah. And what language is the SH file</p> <p>6 in?</p> <p>7 A It's a shell script. So I mean, it's</p> <p>8 a -- I guess it's a -- I'm not sure what language</p> <p>9 you would call them -- call it. But it's</p> <p>10 essentially what happens in the back-end when you</p> <p>11 double click a folder or something like that. So</p> <p>12 just a command line input.</p> <p>13 Q Okay. And I see five files with the</p> <p>14 extension PY.</p> <p>15 Those are written in Python, right?</p> <p>16 A That's right.</p> <p>17 Q What about the generateUdb that doesn't</p> <p>18 have an extension on it? What is that?</p> <p>19 A GenerateUdb -- so one of the steps that</p> <p>20 you have to -- I have to do is I need to generate</p> <p>21 the Understand -- Udb stands for Understand</p> <p>22 database. So this particular file actually does</p> <p>23 help with that.</p> <p>24 I don't know if I actually wrote this</p> <p>25 particular file, honestly. This could be one of</p>	<p style="text-align: right;">Page 141</p> <p>1 Q Okay. And who wrote the DGraph.py file?</p> <p>2 A I wrote I think most part of this one.</p> <p>3 But this could be one of those ones where -- like</p> <p>4 JSON is another format which is very popular</p> <p>5 around. So I might have taken some portion from</p> <p>6 either NetworkX or one of the tools.</p> <p>7 Q What about core S.py? Did you write</p> <p>8 that, as well?</p> <p>9 A Core underscore, yes . PY is a Python</p> <p>10 script that I wrote to run NetworkX. It's, again,</p> <p>11 one of those things that NetworkX documentation</p> <p>12 might be the primary driver of what I wrote in</p> <p>13 there.</p> <p>14 Q And those are inputs to NetworkX, right?</p> <p>15 The two PY files, Python files?</p> <p>16 A That's the actual way to invoke NetworkX,</p> <p>17 core_s.py is a way. DGraph.py is a script that</p> <p>18 would generate the JSON file.</p> <p>19 Q Just so I understand. The PYs are the</p> <p>20 inputs, and the JSONs are the outputs from</p> <p>21 NetworkX?</p> <p>22 A PY is the tool. You can think of it as a</p> <p>23 tool.</p> <p>24 Q Okay.</p> <p>25 A And JSON is the output.</p>

<p style="text-align: right;">Page 150</p> <p>1 full source code, right, not just the declarations?</p> <p>2 A For the NetworkX tool --</p> <p>3 MR. RAMSEY: Objection. Form.</p> <p>4 THE WITNESS: I don't remember the</p> <p>5 starting point for that. Yeah, anything that would</p> <p>6 affect the declaring code would be captured in the</p> <p>7 tool that -- in the -- in sort of the analysis</p> <p>8 Dr. Kemerer was conducting.</p> <p>9 BY MR. PAIGE:</p> <p>10 Q When you say anything that would affect</p> <p>11 the declaring code, do you mean the implementing</p> <p>12 code?</p> <p>13 A It would be things like the declarations,</p> <p>14 for example.</p> <p>15 Q And would it be the implementing code for</p> <p>16 the -- that accompanied the declarations, as well?</p> <p>17 A The reason I'm thinking about it is</p> <p>18 because that particular data involved looking at</p> <p>19 classes. So -- and method declarations in</p> <p>20 particular included in the classes.</p> <p>21 And I mean, there's dependencies. So I</p> <p>22 think it's primarily declaring code, that's what I</p> <p>23 used. But it's from the source code, you're right</p> <p>24 about that.</p> <p>25 Q Don't you need to use the implementing</p>	<p style="text-align: right;">Page 152</p> <p>1 Q Sorry, let me be more clear.</p> <p>2 Are there dependencies created using the</p> <p>3 Understand tool when the implementing code calls a</p> <p>4 particular method?</p> <p>5 A No. So I think we used -- I used a</p> <p>6 particular schema from Understand. And that, I</p> <p>7 believe, is only caused between methods and classes</p> <p>8 in the mechanical engineering. But it's an</p> <p>9 Understand-specific tool.</p> <p>10 Q So it's a setting you can put on</p> <p>11 Understand?</p> <p>12 A It's a schema that they generate. So</p> <p>13 yeah, I follow that.</p> <p>14 Q So there are different ways you can run</p> <p>15 Understand, and you chose to run the way that only</p> <p>16 does declaring code; is that right?</p> <p>17 MR. RAMSEY: Objection. Form.</p> <p>18 THE WITNESS: I didn't choose one way or</p> <p>19 the other. Dr. Kemerer asked me to follow the</p> <p>20 schema that Understand provided.</p> <p>21 BY MR. PAIGE:</p> <p>22 Q Really? Which schema did Dr. Kemerer ask</p> <p>23 you to follow?</p> <p>24 A It's the public documentation schema that</p> <p>25 Understand provides.</p>
<p style="text-align: right;">Page 151</p> <p>1 code to see what calls are made by the implementing</p> <p>2 code to other declaring code?</p> <p>3 A The method declarations have those</p> <p>4 extends, the keyboard extends, the inheritance</p> <p>5 relationships. So the method declarations would</p> <p>6 have those, yes.</p> <p>7 Q But there's also calls made within the</p> <p>8 implementing code, aren't there?</p> <p>9 A There could be. I mean, it's like class</p> <p>10 declarations. Another place we have -- extends</p> <p>11 are -- I mean, again, inheritance relationships</p> <p>12 might be there.</p> <p>13 But anything that would sort of make an</p> <p>14 impact on the declaring code, so it could be some</p> <p>15 portion of the implementation code, but I don't</p> <p>16 think that's the case. It's primarily looking at</p> <p>17 declaring code and the relationships between the</p> <p>18 methods and classes in those -- that set of code.</p> <p>19 Q Are there relationships created for</p> <p>20 NetworkX purposes when the implementing code calls</p> <p>21 a particular method?</p> <p>22 MR. RAMSEY: Objection. Form.</p> <p>23 THE WITNESS: No, the NetworkX tool</p> <p>24 doesn't specify one way or the other.</p> <p>25 BY MR. PAIGE:</p>	<p style="text-align: right;">Page 153</p> <p>1 Q So Dr. Kemerer was the one telling you</p> <p>2 which schema to use in Understand; is that right?</p> <p>3 A Yeah. So just in terms of the process,</p> <p>4 I've used Understand in the past.</p> <p>5 Q Uh-huh.</p> <p>6 A I had a copy of the schema. I asked him</p> <p>7 because these are important choices to be made for</p> <p>8 the -- for his analysis.</p> <p>9 And so he looked at it, and he was</p> <p>10 comfortable with me using that particular schema</p> <p>11 for the purposes of collecting the dependencies.</p> <p>12 Q How many schemas are there?</p> <p>13 A There's one, but I think that schema can</p> <p>14 be -- I mean, you can change the schema to whatever</p> <p>15 you want it to do.</p> <p>16 Q Okay. And how did you suggest to</p> <p>17 Dr. Kemerer the schema be changed?</p> <p>18 MR. RAMSEY: Objection. Form.</p> <p>19 THE WITNESS: I showed him the schema.</p> <p>20 BY MR. PAIGE:</p> <p>21 Q Uh-huh.</p> <p>22 A And asked him if he wanted to make any</p> <p>23 changes to this particular schema.</p> <p>24 Q Uh-huh.</p> <p>25 A He got back to me saying that he was</p>

<p style="text-align: right;">Page 154</p> <p>1 comfortable using that.</p> <p>2 Q Okay. I'm sorry, I thought you had said</p> <p>3 that he picked the schema. And now it sounds like</p> <p>4 you're saying you showed him the schema you had</p> <p>5 chose, and he was comfortable with it.</p> <p>6 So could you please explain further?</p> <p>7 A I didn't make the final choice. What I</p> <p>8 did was I've used Understand in the past.</p> <p>9 Q Uh-huh.</p> <p>10 A So he asked me, what's the -- go and find</p> <p>11 me the schema that Understand provides. I want to</p> <p>12 take a look. I showed it to him. And he decided</p> <p>13 that he wanted me to use that for the purposes of</p> <p>14 the dependency calculation.</p> <p>15 Q When you say that, what do you mean? How</p> <p>16 is the schema being used?</p> <p>17 A It's sort of an input to the Understand</p> <p>18 tool. So we didn't change -- I didn't change any</p> <p>19 of the settings anyway, just used the default</p> <p>20 schema that's used.</p> <p>21 Q And what does the default schema do?</p> <p>22 A It sort of provides the -- sort of the</p> <p>23 types of dependencies it tries to capture.</p> <p>24 Q And what specific dependencies does it</p> <p>25 use?</p>	<p style="text-align: right;">Page 156</p> <p>1 THE WITNESS: I won't characterize it</p> <p>2 exactly that way. He asked me like what's the --</p> <p>3 what does Understand exactly capture, I want to</p> <p>4 know. I gave him the schema. And he -- and I</p> <p>5 asked him, you tell me what you want to pick out of</p> <p>6 this choice.</p> <p>7 And he decided. He said, Let's go with</p> <p>8 the schema that Understand provides.</p> <p>9 BY MR. PAIGE:</p> <p>10 Q When you say you gave him the schema,</p> <p>11 what do you mean by that?</p> <p>12 A I showed it to him when I was with him.</p> <p>13 And so he asked me, Can I see the schema? So I</p> <p>14 opened it and showed it to him.</p> <p>15 Q So did he read the Python script?</p> <p>16 A He could have read it. I wasn't like</p> <p>17 part of that process of him reading it.</p> <p>18 But I -- I mean, I showed it to him when</p> <p>19 I was there. And he took a look at it when I was</p> <p>20 there.</p> <p>21 He told me a couple of days later he was</p> <p>22 fine using that.</p> <p>23 Q Okay. And did you explain to him what is</p> <p>24 in the schema, or did he just look at the Python</p> <p>25 file?</p>
<p style="text-align: right;">Page 155</p> <p>1 MR. RAMSEY: Objection. Form.</p> <p>2 THE WITNESS: It uses, again, inheritance</p> <p>3 method, caused, method declarations, things like</p> <p>4 that. So I would need to look at the schema</p> <p>5 specifically, but it's all the regular, like,</p> <p>6 relationship maps between method, classes, things</p> <p>7 like that.</p> <p>8 BY MR. PAIGE:</p> <p>9 Q Did you provide the schema in the</p> <p>10 documents you've sent over the past week?</p> <p>11 A I think I did.</p> <p>12 Q Where is that found?</p> <p>13 A I probably need to look at it.</p> <p>14 Q Sure.</p> <p>15 A I can't tell which folder it is, but</p> <p>16 you've got the Udb schema Java.py. That's the</p> <p>17 schema.</p> <p>18 Q That's the schema you used?</p> <p>19 A That's right.</p> <p>20 Q Okay. And just so I understand, you</p> <p>21 said, Dr. Kemerer, here is the default schema. Is</p> <p>22 this okay with you? And he said, Yes, it seems</p> <p>23 fine to me.</p> <p>24 Is that how it went down?</p> <p>25 MR. RAMSEY: Objection. Form.</p>	<p style="text-align: right;">Page 157</p> <p>1 A He took a look at it. He's done</p> <p>2 object-oriented programming in the past. So he</p> <p>3 understands the method class package relationships.</p> <p>4 And that's to the extent which I talked about with</p> <p>5 him.</p> <p>6 Q Okay. So you didn't explain what was in</p> <p>7 the schema, you just gave him the file; is that</p> <p>8 right?</p> <p>9 A No. He asked me, Can you open the file</p> <p>10 on my computer?</p> <p>11 Q Uh-huh.</p> <p>12 A Talked about what these are. I pointed</p> <p>13 him to the documentation because that has most --</p> <p>14 it has almost all the information that you need.</p> <p>15 Q Uh-huh.</p> <p>16 A And he -- and then he asked me a few</p> <p>17 questions along what this is, what that is. I</p> <p>18 can't remember specific questions.</p> <p>19 And then he -- and then a couple of days</p> <p>20 later, he asked me, Okay, let's use the Understand</p> <p>21 schema that you showed me.</p> <p>22 Q What questions did he ask you and what</p> <p>23 information did you give him in return?</p> <p>24 A Like I said, I don't know specific</p> <p>25 portions of that particular script. He asked me if</p>

<p>1 files rather than the Java files; is that right?</p> <p>2 A So let me just explain the process a</p> <p>3 little more. First, he sort of asked me to look at</p> <p>4 the source file, the Android source file.</p> <p>5 Out of the Android source file, I found</p> <p>6 the current.txt or current.xml, are sort of two</p> <p>7 files that are present in the source code</p> <p>8 containing what I needed that he had asked me to</p> <p>9 pull for his analysis. And I asked him that -- if</p> <p>10 this file is okay for me to parse.</p> <p>11 And he said it was fine to use that. So</p> <p>12 in that sense, he directed me to that particular</p> <p>13 file.</p> <p>14 Q So you suggested to him, and he said it</p> <p>15 was fine; is that right?</p> <p>16 A I found that particular -- found that</p> <p>17 particular file, proposed it to him. He made the</p> <p>18 final call.</p> <p>19 Q Did you offer him the alternative of</p> <p>20 using Javadoc on the .Java files from Android</p> <p>21 itself?</p> <p>22 A Like I said, I didn't directly consider</p> <p>23 that as an option because I had found this file.</p> <p>24 So I actually did not consider that.</p> <p>25 The process step on the Java side was</p>	<p>1 step really can change.</p> <p>2 As long as I'm accurately capturing the</p> <p>3 output, I could use different things. So in that</p> <p>4 sense, I don't think the -- it has -- I mean, I</p> <p>5 don't consider it to be an apples to apples in any</p> <p>6 respect one way or the other. I can't tell how you</p> <p>7 would compare it. It's almost like a black box if</p> <p>8 you might think of it that way.</p> <p>9 BY MR. PAIGE:</p> <p>10 Q Okay. But you could have used Javadoc on</p> <p>11 the Android Java files, right?</p> <p>12 A I don't know.</p> <p>13 MR. RAMSEY: Objection. Form.</p> <p>14 THE WITNESS: I haven't done that, so I</p> <p>15 don't know.</p> <p>16 BY MR. PAIGE:</p> <p>17 Q You haven't investigated that at all?</p> <p>18 A No.</p> <p>19 Q Okay. Who created the graphs in</p> <p>20 Dr. Kemerer's report relating to the stability</p> <p>21 analysis?</p> <p>22 A He asked me to plot them, so I put them</p> <p>23 together.</p> <p>24 Q So you created the graphs in</p> <p>25 Dr. Kemerer's report relating to the stability</p>
<p>1 also discussed with Dr. Kemerer. And so he was</p> <p>2 aware of my usage of the Javadoc tool. So, I mean,</p> <p>3 he didn't bring it up when I spoke with him on --</p> <p>4 when I gave him this as an option.</p> <p>5 Q So what you're saying is he could have</p> <p>6 figured out that the Android .Java files could be</p> <p>7 used with Javadoc and ask you to do that, but he</p> <p>8 didn't ask you to do that; is that right?</p> <p>9 A Again, it would be a guess on my part.</p> <p>10 If he could figure out or not figure out, I don't</p> <p>11 know that. But he had -- I mean, he had the same</p> <p>12 kind of information I did, I just didn't process</p> <p>13 it.</p> <p>14 Q You never told him that you could use</p> <p>15 Javadoc on Android as well as on Java, did you?</p> <p>16 A Like I said, I didn't consider it. I</p> <p>17 don't know if I actually told him or not, but --</p> <p>18 no, I don't remember.</p> <p>19 Q Okay. So you didn't start off apples to</p> <p>20 apples but doing it with Javadoc for both, right?</p> <p>21 MR. RAMSEY: Objection. Form.</p> <p>22 THE WITNESS: It's -- ultimately, my task</p> <p>23 is to collect the data. As long as I'm comfortable</p> <p>24 with the inputs that I'm using, and I'm comfortable</p> <p>25 with what I'm getting as an output, the process</p>	<p>1 analysis?</p> <p>2 A I plotted them out for him.</p> <p>3 Q And did you create the graphs in</p> <p>4 Dr. Kemerer's report relating to the centrality</p> <p>5 analysis?</p> <p>6 A Yes. I think I plotted them out, as</p> <p>7 well. I'm not sure right now. But, yeah, I think</p> <p>8 I would have plotted them.</p> <p>9 Q Who drafted the text of Dr. Kemerer's</p> <p>10 report?</p> <p>11 A He drafted his text.</p> <p>12 Q Did you draft any of it?</p> <p>13 A I provided some inputs to -- comments on</p> <p>14 the portion that related to the data collection</p> <p>15 effort for his analysis. So to that extent, I</p> <p>16 provided some inputs.</p> <p>17 Q Now, your methodology measures changes</p> <p>18 based on what's put out in the API documentation,</p> <p>19 correct?</p> <p>20 MR. RAMSEY: Objection. Form.</p> <p>21 THE WITNESS: Again, Dr. Kemerer decided</p> <p>22 on the metric to use. It uses a set of inputs that</p> <p>23 he provided. I just ran the data collection effort</p> <p>24 in that to generate the output that he wanted.</p> <p>25</p>

<p style="text-align: right;">Page 210</p> <p>1 Q How do you get 248, Mr. Chatterjee?</p> <p>2 MR. RAMSEY: Objection. Form.</p> <p>3 THE WITNESS: That's what you get when</p> <p>4 you download it from the Oracle website.</p> <p>5 BY MR. PAIGE:</p> <p>6 Q Are there 248 APIs in Java SE?</p> <p>7 A These are the packages that are -- that</p> <p>8 you get when you download the JDK.</p> <p>9 Q So it's your testimony there are 248 API</p> <p>10 packages in Java SE?</p> <p>11 A I don't know the exact numbers, but these</p> <p>12 are the ones that I got when I downloaded it from</p> <p>13 the Oracle website.</p> <p>14 Q Would you turn to page 159 of</p> <p>15 Exhibit 1612, please, sir.</p> <p>16 A I'm there.</p> <p>17 Q Okay. Do you see where Dr. Kemerer's</p> <p>18 report totals up the total number of APIs in each</p> <p>19 version of Java SE down at the bottom where it says</p> <p>20 total?</p> <p>21 A I see that.</p> <p>22 Q Okay. How many APIs does Java SE have,</p> <p>23 at most, according to Dr. Kemerer?</p> <p>24 A I can't tell from here. I need to look</p> <p>25 at the data. Because it depends on the maximum</p>	<p style="text-align: right;">Page 212</p> <p>1 A So it appears that this is coming from</p> <p>2 there. And the other file that we just talked</p> <p>3 about is from the source code, the JDK.</p> <p>4 Q So there are things in the R script here</p> <p>5 in Appendix C that are not in the documentation for</p> <p>6 Java SE? Is that what you're saying?</p> <p>7 A There could be. I mean, there are, like,</p> <p>8 for example -- there are support files, sometimes</p> <p>9 people put in -- I don't know. I have to do that</p> <p>10 comparative analysis, but there could be, yes.</p> <p>11 Q Could be, but you don't know one way or</p> <p>12 another?</p> <p>13 A I couldn't tell one way or the other for</p> <p>14 sure.</p> <p>15 Q So who decided to take these particular</p> <p>16 248 APIs?</p> <p>17 A It comes from the JDKs that you download</p> <p>18 from the Oracle website. And so Professor Kemerer</p> <p>19 told me to do that, and so it comes from there. So</p> <p>20 he decided.</p> <p>21 Q Okay. Who made the decision to use all</p> <p>22 248 in this script?</p> <p>23 A He made the decision. I mean, he said</p> <p>24 capture all the packages that are coming from the</p> <p>25 JDK.</p>
<p style="text-align: right;">Page 211</p> <p>1 numbers across this -- I mean, it could be like</p> <p>2 some APIs were removed from one portion and added</p> <p>3 on another one. So you need to take a look at the</p> <p>4 total number.</p> <p>5 Q Well, Dr. Kemerer seems to have a listing</p> <p>6 of all the APIs from versions 1 through 8. And it</p> <p>7 looks like they weren't really removed, right?</p> <p>8 A I can't tell -- I did do the analysis,</p> <p>9 but I think one thing that might be helpful to know</p> <p>10 is that this is from the documentation. This comes</p> <p>11 from the documentation, I guess, from the online</p> <p>12 documentation. And the JDK might have more</p> <p>13 packages.</p> <p>14 Q Appendix G comes from the online</p> <p>15 documentation?</p> <p>16 A I think so.</p> <p>17 Q Did you prepare Appendix G yourself,</p> <p>18 Mr. Chatterjee?</p> <p>19 A I put it together, but it looks like</p> <p>20 that. Just based on the -- I have a Java SE 1.5</p> <p>21 being 166, that number there, at the end, that</p> <p>22 appears to be the number that's usually listed in</p> <p>23 the -- if you count the number of packages in the</p> <p>24 API documentation.</p> <p>25 Q Uh-huh.</p>	<p style="text-align: right;">Page 213</p> <p>1 Q He told you use all 248 in the JDK, that</p> <p>2 was his specific words to you?</p> <p>3 A Specific words, I can't remember. But he</p> <p>4 said use the packages that are coming from the JDK,</p> <p>5 and I did that.</p> <p>6 Q Okay. So your testimony is Dr. Kemerer</p> <p>7 told you, take all the packages from the JDK, and</p> <p>8 that ended up being 248, right?</p> <p>9 A From the publicly-available -- yeah --</p> <p>10 source code.</p> <p>11 Q And you recall this -- that it's from the</p> <p>12 JDK how?</p> <p>13 A I mean, it's from the -- that particular</p> <p>14 data collection effort started with the source</p> <p>15 code, so it comes from that.</p> <p>16 Q But do you know that, or are you just</p> <p>17 kind of reconstructing?</p> <p>18 MR. RAMSEY: Objection. Form.</p> <p>19 THE WITNESS: I'm pretty confident about</p> <p>20 it.</p> <p>21 BY MR. PAIGE:</p> <p>22 Q Pretty confident?</p> <p>23 A Yes.</p> <p>24 Q Why are you pretty confident?</p> <p>25 A Because this comes from the source code.</p>

<p style="text-align: right;">Page 222</p> <p>1 Q In any event, Mr. Chatterjee, you would 2 agree that you didn't do the same thing with 3 respect to Android that you did to Java, you didn't 4 look at the source code files as opposed to the 5 documentation files in order to put together your 6 script, right?</p> <p>7 MR. RAMSEY: Objection. Form.</p> <p>8 THE WITNESS: I don't know what you are 9 calling documentation files, but I looked at the 10 source code for both Java and Android. In case of 11 the Android, I looked at the TXT and XML files.</p> <p>12 BY MR. PAIGE:</p> <p>13 Q Not the Java files, right?</p> <p>14 A Not the Java files for the Android side, 15 but it's a part of the source code.</p> <p>16 Q And you looked at the Java files for the 17 Java SE side, correct?</p> <p>18 MR. RAMSEY: Objection. Form.</p> <p>19 THE WITNESS: I looked at the .Java files 20 -- I mean, in terms of the data collection for DSM, 21 that's where I started.</p> <p>22 BY MR. PAIGE:</p> <p>23 Q Okay. Who told you to do it differently 24 as between Android and Java?</p> <p>25 A So I don't know how you would</p>	<p style="text-align: right;">Page 224</p> <p>1 MR. RAMSEY: Objection. Form.</p> <p>2 THE WITNESS: Again, it's not the 3 methodology; it's the data source. He pointed me 4 to the Android source code. This is a part of the 5 source code that I found. I asked him whether it 6 was okay to use this particular part of the source 7 code. He said he was comfortable using that.</p> <p>8 BY MR. PAIGE:</p> <p>9 Q And did you suggest to him that you could 10 instead use the .Java files on the Android website 11 so it would be the same methodology you're using 12 with Java?</p> <p>13 MR. RAMSEY: Objection to form.</p> <p>14 THE WITNESS: I don't know, like I said, 15 if it's the same methodology or not. I can't 16 comment to that. Because essentially it's taking 17 information and putting it in a particular format.</p> <p>18 And so I -- like I said, he told me to look at the 19 Android source code, went to the source code, 20 looked at it and found the current.txt, current.xml 21 file, showed it to him, and he was comfortable 22 using it because it was part of the source code.</p> <p>23 And the Java source code is what I used on the Java 24 side.</p> <p>25</p>
<p style="text-align: right;">Page 223</p> <p>1 characterize it's different or not. But it is -- 2 it's from the source code, same source code in the 3 sense that both coming from the source code files.</p> <p>4 In terms of making the choice of using 5 the current.txt and current.xml, Dr. Kemerer told 6 me -- like I said, the process I was describing to 7 you before, when I was looking through the source 8 code, found the current.txt, current.xml, I -- 9 seemed to contain the information, double-check 10 that. And then proposed that to Dr. Kemerer, and 11 he said he was comfortable using that particular 12 file for this starting point.</p> <p>13 Q Okay. So you proposed it to Dr. Kemerer, 14 he said okay?</p> <p>15 A He asked me to look at the source code. 16 This is a part of the source code. I looked at it, 17 and I found this particular file. And I proposed 18 it as a potential data source.</p> <p>19 He's the one who decided that's what 20 we'll use.</p> <p>21 Q Okay. So I want to be sure your 22 testimony is clear.</p> <p>23 You proposed this methodology to 24 Dr. Kemerer, and he said okay, that makes sense to 25 him?</p>	<p style="text-align: right;">Page 225</p> <p>1 BY MR. PAIGE:</p> <p>2 Q Did you suggest to him that you could 3 also used the Java source code on the Android side?</p> <p>4 MR. RAMSEY: Objection. Form.</p> <p>5 THE WITNESS: I mean, it's almost like an 6 obvious thing. I mean, you could use it if you 7 want to use it.</p> <p>8 BY MR. PAIGE:</p> <p>9 Q Sorry. I'll move to strike the answer as 10 nonresponsive and ask the question again.</p> <p>11 A Okay.</p> <p>12 Q Did you suggest to him that you could use 13 the Java source code on the Android side for this?</p> <p>14 MR. RAMSEY: Objection to form.</p> <p>15 THE WITNESS: I can't recall. He told me 16 to look at the source code, so I looked at the 17 source code. And that had Java files as well as 18 these files that I described before. So 19 specifically did I tell him that you could also 20 look at the Java files, I don't remember if I told 21 him one way or the other. But definitely if you 22 want to use it, you can use it.</p> <p>23 BY MR. PAIGE:</p> <p>24 Q Okay. So you don't know one way or 25 another whether you gave Dr. Kemerer an option of</p>

<p style="text-align: right;">Page 246</p> <p>1 THE VIDEOGRAPHER: This marks the end of 2 Volume I, Media Number 3 of the deposition of Rohit 3 Chatterjee. The time is 3:51 p.m. We're off the 4 record.</p> <p>5 (Short break taken.)</p> <p>6 THE VIDEOGRAPHER: We are back on the 7 record at 4:04 p.m. This marks the beginning of 8 Volume I, Media Number 4 of the deposition of Rohit 9 Chatterjee. Please continue.</p> <p>10 MR. PAIGE: Mr. Chatterjee, welcome back. 11 You understand you're still under oath?</p> <p>12 THE WITNESS: I do understand.</p> <p>13 BY MR. PAIGE:</p> <p>14 Q If you could take a look at Exhibit 1610, 15 please. It's the large 11-by-17 paper from your 16 raw data.</p> <p>17 A 1610, yes.</p> <p>18 Q Do you see where the second-to-last 19 column is the changes between API levels 21 and 22?</p> <p>20 A Yes. I see that column.</p> <p>21 Q And do you see the row for Android 22 hardware camera2?</p> <p>23 A Android hardware camera2?</p> <p>24 Q It's roughly 17 from the bottom.</p> <p>25 A I see that.</p>	<p style="text-align: right;">Page 248</p> <p>1 And the files in the source code. 2 So I don't remember if I looked at this 3 particular -- this particular package in the 4 documentation specifically.</p> <p>5 BY MR. PAIGE:</p> <p>6 Q Did you look at any particular packages 7 in the documentation specifically to confirm 8 whether changes had or had not been made?</p> <p>9 A Yeah. I definitely looked at the 10 documentation changes. Now, I can't remember. 11 There are so many packages here. I can't remember 12 exactly if I looked at one package versus the 13 other.</p> <p>14 Q Well, what generally did you do to look 15 at the documentation to confirm the number of 16 changes?</p> <p>17 A I went back to see the method 18 declarations between the different API levels, did 19 sort of -- like I said, this is -- a lot of it is 20 just an automated process. You can actually do -- 21 if you spend some time, you can actually do this 22 data collection by just looking at the different 23 API levels and the documentation for why -- some of 24 the information that I needed to do that.</p> <p>25 But ultimately, like I said, I looked</p>
<p style="text-align: right;">Page 247</p> <p>1 Q Okay. And do you see where the data you 2 produced suggests that there are 179 changes in 3 Android.hardware.camera2 between API levels 21 and 4 22?</p> <p>5 A Yes, I see that number.</p> <p>6 Q Do you believe that number to be correct?</p> <p>7 A Yes. To the extent this -- yes. This 8 is -- yeah, representing the same thing I saw on 9 the spreadsheet. This number should be correct. I 10 believe it's correct.</p> <p>11 Q Now, are you aware that Android publishes 12 on its website the changes it makes to APIs?</p> <p>13 MR. RAMSEY: Objection. Form.</p> <p>14 THE WITNESS: I've seen reports that 15 probably do that. But not fully aware.</p> <p>16 BY MR. PAIGE:</p> <p>17 Q Well, did you look at the documentation 18 available on the Android website to see whether any 19 changes were made to Android.hardware.camera2?</p> <p>20 MR. RAMSEY: Objection. Form.</p> <p>21 THE WITNESS: I looked at the source code 22 for Android, right. So I didn't go back to the API 23 documentation to make sure -- so I went back to the 24 source code to make sure that the changes mapped 25 back into the source code.</p>	<p style="text-align: right;">Page 249</p> <p>1 back to the source code where I saw the changes 2 being mapped out, and that's what I captured.</p> <p>3 Q When you say the source code, what file 4 specifically did you look at for API level 22? Was 5 that current.txt?</p> <p>6 A Yeah, it's the current.txt, current.xml.</p> <p>7 I also looked back at the -- I'm trying 8 to remember if I actually looked back at any other 9 things specifically.</p> <p>10 But that was the source I started with.</p> <p>11 And that's the -- that's a part of the source code.</p> <p>12 Q Could you compile current.txt into an 13 executable file?</p> <p>14 MR. RAMSEY: Objection. Form.</p> <p>15 THE WITNESS: So current.txt and 16 current.xml, it's my understanding is that it -- it 17 is almost like a -- it's a signature test of some 18 sort when you build the Android operating system.</p> <p>19 So essentially, the method declarations 20 that are present in current.txt and current.xml is 21 the one that's actually checked to make sure that 22 everything present in current.txt and current.xml 23 is matched with whatever you're trying to build in 24 Android. And so it's sort of a signature test to 25 do that.</p>

<p>1 APIs had changed?</p> <p>2 MR. RAMSEY: Objection. Form.</p> <p>3 THE WITNESS: I didn't decide to do the</p> <p>4 stability analysis, again, for this particular</p> <p>5 matter. I wasn't asked to do it, so I don't know.</p> <p>6 BY MR. PAIGE:</p> <p>7 Q When you were asked to play your role in</p> <p>8 the stability analysis, did you look for tools that</p> <p>9 would be capable of telling you whether APIs had</p> <p>10 changed?</p> <p>11 MR. RAMSEY: Objection. Form.</p> <p>12 THE WITNESS: I might have. But again,</p> <p>13 it really depends on the definition of the change</p> <p>14 which Dr. Kemerer defined. So based on what he</p> <p>15 said, I don't think I found any tool that could do</p> <p>16 it. I had to write a script to collect that data.</p> <p>17 BY MR. PAIGE:</p> <p>18 Q What do you mean by based on what he</p> <p>19 said, you don't think you found any tool that could</p> <p>20 do it?</p> <p>21 A So he had -- he wanted to measure the</p> <p>22 changes for the declaring code. He wanted to,</p> <p>23 like, capture certain parts of the declaring code,</p> <p>24 like I mentioned before.</p> <p>25 I personally have not come across -- I</p>	<p>Page 286</p> <p>1 not. I don't know.</p> <p>2 Q Did you look for tools that would do</p> <p>3 that?</p> <p>4 A So the -- I can't remember if I looked</p> <p>5 for it. But again, the work that I was asked to do</p> <p>6 is just literally collecting the data in a way --</p> <p>7 putting it in a format which is easy to -- I mean,</p> <p>8 sort of analyze later.</p> <p>9 And I don't know if I would even have</p> <p>10 thought about using any other specific tool to do</p> <p>11 that one way or the other. And I don't remember if</p> <p>12 I actually looked or not.</p> <p>13 Q So you just decided to write a script</p> <p>14 without ever looking to see if there were tools</p> <p>15 that could do what your script does?</p> <p>16 A I wasn't aware of a tool at that time. I</p> <p>17 probably -- I might have looked as well, but I</p> <p>18 can't tell if there's a tool which allowed me to do</p> <p>19 what Professor Kemerer specifically asked me to</p> <p>20 capture in this particular work.</p> <p>21 Q You said you weren't aware of a tool at</p> <p>22 that time.</p> <p>23 Are you now aware of a tool?</p> <p>24 A No. I don't -- I haven't looked.</p> <p>25 Q You haven't looked?</p>
<p>1 don't think I've come across a tool that would do</p> <p>2 all of this specific requests in a way that he</p> <p>3 wanted it, so writing a script was the best way I</p> <p>4 thought of doing it.</p> <p>5 Q So let me unpack that a little bit.</p> <p>6 Have you previously come across tools</p> <p>7 that would be capable of measuring API changes that</p> <p>8 didn't capture everything that Dr. Kemerer wanted</p> <p>9 to have measured?</p> <p>10 MR. RAMSEY: Objection. Form.</p> <p>11 THE WITNESS: No. API changes, no, I</p> <p>12 don't think so. I've not come across the tool.</p> <p>13 BY MR. PAIGE:</p> <p>14 Q So I'm trying to understand. I mean, it</p> <p>15 sounds to me like what you're saying is that there</p> <p>16 might be tools that measure API changes, but</p> <p>17 Dr. Kemerer wanted more than conventional tools can</p> <p>18 do.</p> <p>19 Is that what you're saying?</p> <p>20 A No. He had defined what he wanted to</p> <p>21 capture. The data sources that he used were</p> <p>22 publicly available data sources. I was asked to</p> <p>23 put together the -- based on his requirements, what</p> <p>24 he wanted to capture. And I don't know if there</p> <p>25 are specific tools that would do exactly that or</p>	<p>Page 287</p> <p>Page 289</p> <p>1 A No.</p> <p>2 Q Have you ever --</p> <p>3 A I mean, I haven't looked right now,</p> <p>4 recently, if you're asking me that.</p> <p>5 Q Have you ever heard of a tool called API</p> <p>6 check from Google?</p> <p>7 A API check. No.</p> <p>8 Q Do you know what it does?</p> <p>9 A I don't know if I came across it. I</p> <p>10 don't know.</p> <p>11 Q Have you heard of a tool called Doclava,</p> <p>12 that's D-O-C-L-A-V-A, from Google?</p> <p>13 A I don't know again.</p> <p>14 I don't know. I don't know if I've seen</p> <p>15 that or not, but I -- it doesn't sound familiar.</p> <p>16 Q Okay. Have you read any expert reports</p> <p>17 aside from Dr. Kemerer's and Dr. Schmidt's in this</p> <p>18 case?</p> <p>19 A I've skimmed through -- yes, I have</p> <p>20 skimmed through some of the other reports.</p> <p>21 Q What other reports have you skimmed</p> <p>22 through?</p> <p>23 A Professor Astrachan's report.</p> <p>24 Q Any others that you've skimmed besides</p> <p>25 Dr. Astrachan's?</p>